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A SUPPLEMENTARY DESCRIPTION OF *PINNIXA TOMENTOSA* AND COMPARISON WITH THE GEOGRAPHICALLY ADJACENT *PINNIXA TUBICOLA* (BRACHYURA, PINNOTHERIDAE)[1]

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Abstract.—Two species of morphologically similar pinnotherid crabs, *Pinnixa tomentosa* and *P. tubicola* are commensal with the same host where their ranges overlap in Southern California. This paper presents the first description of the male of *P. tomentosa*, elaborates on the existing description of the female, and clarifies differences between the two species of crabs. *P. tomentosa* males have a smooth palm on the chelae; *P. tubicola* males have tuberculate palms. In *P. tomentosa* the propodus of the third walking leg terminates in 3–5 spines; this article is smooth in *P. tubicola*. The interorbital margin of the carapace in female *P. tomentosa* is produced beyond the upper anterolateral margin; it is recessed in female *P. tubicola*.

The genus *Pinnixa* has at least 11 species which are known to inhabit the West Coast of North America. These species are usually quite host specific (Rathbun, 1918; Schmitt, 1921; Wells, 1928; Schmitt et al., 1973). The two species dealt with in this paper inhabit the tubes of annelid worms. The polychaete *Chaetopterus variopedatus*, onuphids, and terebellids are their hosts in Southern California and Baja California. *Pinnixa tomentosa* has been reported to range from San Felipe, Gulf of California, south to Cape San Lucas, and north along the west coast to Monterey, although we have seen no specimens from north of San Diego; *P. tubicola* has been reported to range from San Diego northward to Puget Sound, Washington. According to Rathbun (1918), neither of these species has Atlantic coast or Southern Hemispheric analogues.

Although *P. tubicola* was fairly well defined by both Rathbun (1918) and Wells (1928), *P. tomentosa* has not been well described. Rathbun based her description of *P. tomentosa* on data from Holmes (1894), and on the examination of a single female specimen, lacking chelipeds, taken at San Clemente. We are not aware that the male *P. tomentosa* has been described, and we believe that the paucity of specimens of *P. tomentosa* has led to some important oversights in the description of the external features of this species, and in the differences between this and the similar species, *P. tubicola*. The dichotomous keys supplied by both Rathbun (1918) and Schmitt (1921) are not adequate for the separation of these two species inasmuch as the keys are based upon measurements we have found to be unreliable.

The purpose of this paper is to enlarge upon the diagnostic external

morphology of both male and female *P. tomentosa* in comparison with *P. tubicola.*

Material Examined

The principal material used in this study was more than 500 fresh specimens of male and female *P. tomentosa* and female *P. tubicola,* taken from *Chaetopterus* tubes collected at the entrance channel to Mission Bay at San Diego. In addition, we have examined the following material from the collections of the National Museum of Natural History and the Allan Hancock Foundation collections:

P. tomentosa: USNM 68331, 1♂, 1♀, San Felipe, Mexico.

P. tubicola: USNM 24752, 1♀, Pt. Conception, California; USNM 60110, 1♂, Pacific Grove, California; AHF 1464-42, 3♂, 1♀, Oregon; USNM 53308, 1♂, 1♀, Nanaimo, British Columbia.

We are grateful for the loan of this material.

Pinnixa tomentosa Lockington
Figs. 1A–C; 2A–C

Pinnixa tomentosa Lockington, 1876:156 (type-locality, Angeles Bay, Gulf of California). Holmes, 1894:568.—Rathbun, 1918:141.—Schmitt, 1921: 258.

Supplementary description.—Female: Carapace between 2 and 2½ times as wide as long, appearing hexagonal due to protrusion of interorbital margin and curvature of upper anterolateral margins; upper anterolateral margin with 5–9 well defined spines near juncture with posterolateral margin; posterolateral margin minutely tuberculated; interorbital margin produced so that front and orbits protrude beyond lower, or true, anterolateral margin as viewed from above. Gastric and cardiac regions on single plane with carapace sloping downward from that plane in all directions producing a rounded appearance; cardiac ridge not prominent though distinctly set off by deep cervical groove. Front with short bristles, lateral edges near and beyond slope of carapace heavily bristled. Chelae robust; dactylus with tooth in proximal half; fixed finger with variable number of teeth together in single group. Lower margin of palm smooth, concave below intersection of propodus and dactylus giving fixed finger appearance of being slightly bent downward. Tip of dactylus curved downward, closing inside upcurving tip of propodus; 3–4 small tubercles on outside of upturned distal extremity of fixed finger. Short bristles cover entire dorsal surface of palm, dactylus, and ventral and outer surfaces of fixed finger; thick bristles line opposing surfaces of both fingers distal to group of teeth on

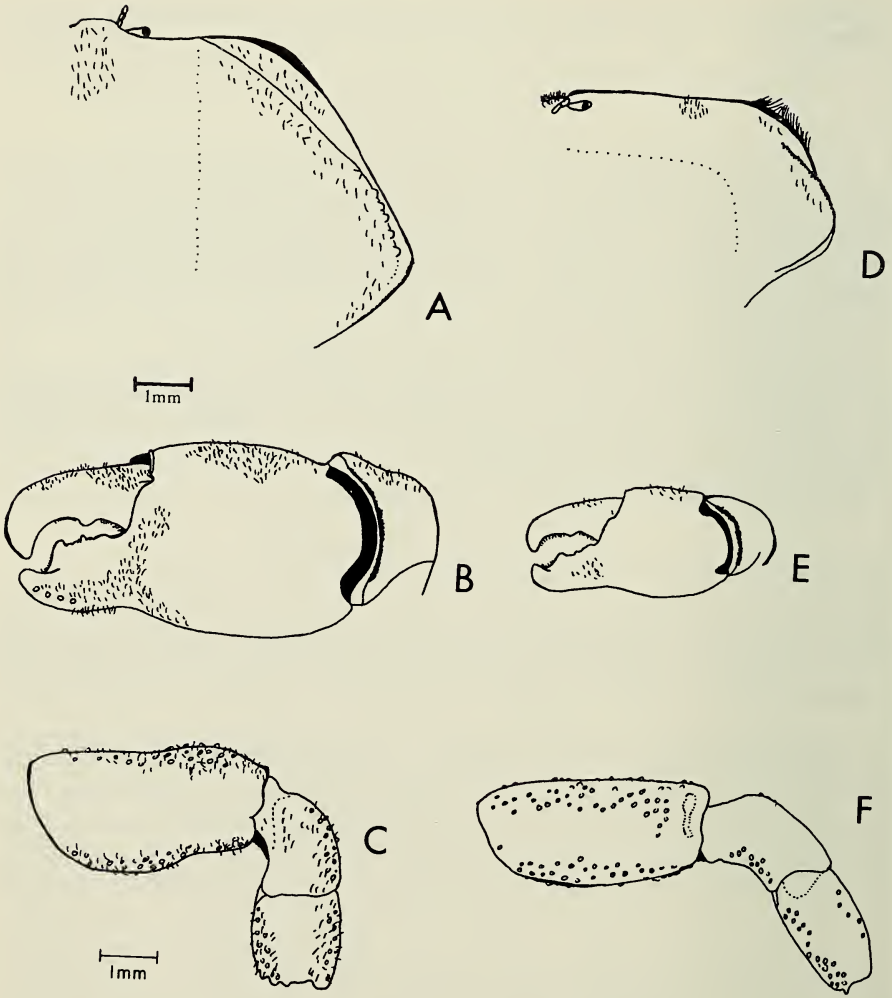

Fig. 1. *Pinnixa tomentosa* (left) and *P. tubicola* (right) females: A, D, Right dorsal carapace; B, E, Left cheliped; C, F, 3rd walking leg, merus, carpus and propodus.

propodus; proximal half of inner surface dactylus with bristles; opposing surface of fixed finger without bristles.

Third walking leg largest, followed in order of size by second, first and fourth. Third as follows: dactylus with corneous tip, heavily tubercled and bristled, tubercles tending to become spiniform; propodus squarish, heavily tubercled on lower surface and terminating in 3–5 spines, bristles thick on upper and lower surfaces; carpus with a few tubercles on heavily bristled

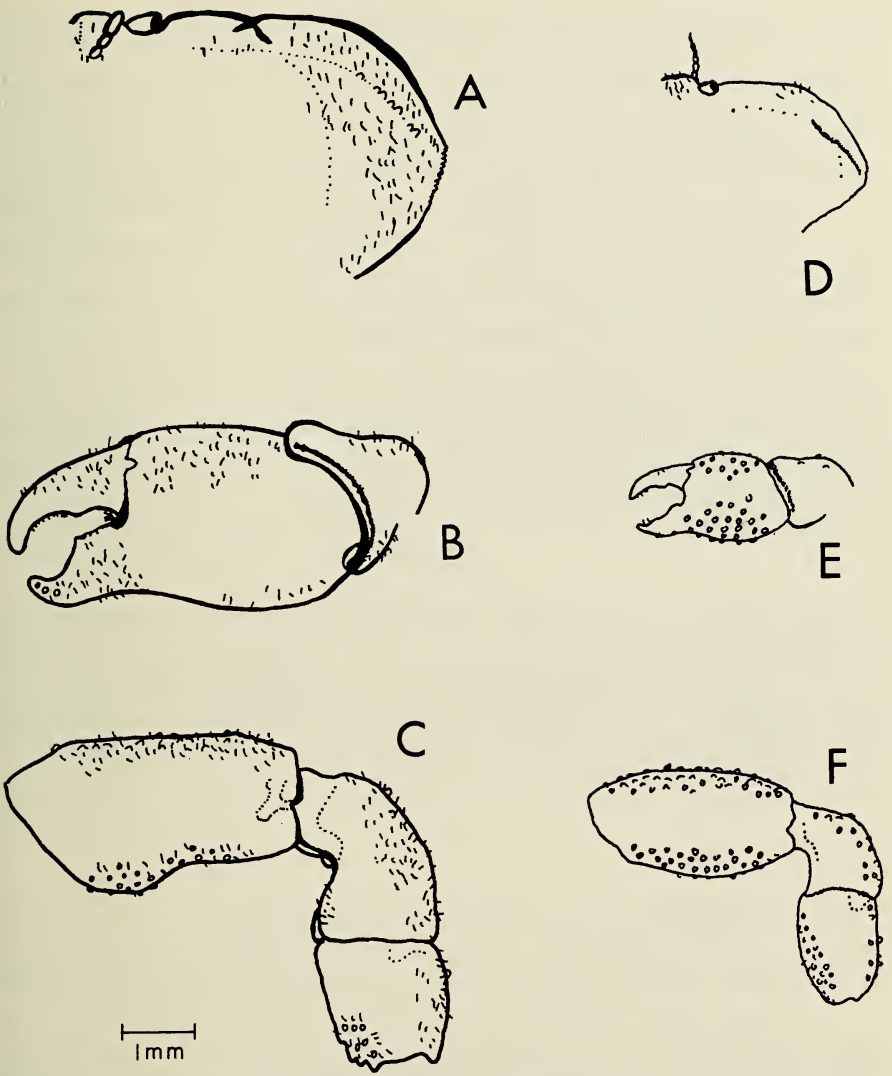

Fig. 2. *P. tomentosa* (left) and *P. tubicola* (right) males: A, D, Right dorsal carapace; B, E, Left cheliped; C, F, 3rd walking leg, merus, carpus and propodus.

dorsal surface; merus heavily tubercled, with bristles above and below; raised areas dorsally at distal end and ventrally at proximal end.

Male: Carapace 1½–2 times as wide as long, similar to female except front more pronounced, upper anterolateral margin less curved, and lower anterolateral margin extending farther laterally before curving posteriorly.

Chelae as in female, but distal extreme or dactylus less hooked. Walking legs similar to female.

Color: Sexes similar, carapace being mottled brown and cream, appendages light tan.

Size: Females, as a rule, are larger (and more abundant). Mature females have a width varying from 7.4–14.9 mm, and males from 3.0–11.8 mm in a total sampling of 343 females and 133 males. The females varied from 1.9–2.5 times as wide as long in a sample of 104. The males varied from 1.6–2.2 times as wide as long in a sample of 77.

Range.—San Felipe (USNM 68331) south to Cape San Lucas and then north on the West Coast to Monterey (Schmitt et al., 1973).

Habitat.—Commensal with chaetopterid, onuphid, and terebellid polychaete worms from intertidal to subtidal depths.

Notes.—This species has been found to be ovigerous in the spring in the San Diego area. It has also been found to be a host for several ectocommensals such as ectoprocts and foraminiferans.

Discussion

At the region of contiguity and overlap of the ranges of *P. tomentosa* and *P. tubicola*, the identities of these two species may be confused by their generally similar appearance and by the lack of clear separating characters in the existing literature. To separate them in Schmitt's dichotomous key to the California species of *Pinnixa* (1921:256), the following can be applied (see Figs. 1 and 2, A–C for *P. tomentosa*, D–F for *P. tubicola*):

II....
B....
1....

a. Interorbital margin in females beyond upper anterolateral margin when viewed from above; propodus of third walking leg terminating in 3–5 spines; palm of chelae in males smooth. *tomentosa*, p. 258.

b. Interorbital margin in females recessed, orbits lying in plane of slope of carapace between upper and lower anterolateral margins when viewed from above; propodus of third walking leg without spines; palm of chelae of males tuberculate. *tubicola*, p. 265.

The females are most easily distinguished by the carapace character, *Pinnixa tubicola* appearing nearly rectangular in shape, and *P. tomentosa* more nearly hexagonal. Because of the protruding rostrum of males this character is less evident than in the females, but the males can be separated on the basis of the tuberculature of the palm of the chelae of *P. tubicola* as opposed to the smooth palm of *P. tomentosa.*

The difficulty in using the bristles as an identifying character arises

from these commensals' habitat. Fresh specimens of both specimens are generally covered with detritus, and in this condition both species seem to be very "tomentose." Application of a bottle brush will remove most of this, but the degree of coverage by what appear to be bristles depends entirely upon the amount of brushing. A thoroughly cleaned specimen of *P. tomentosa* will show bristles only after close scrutiny under magnification. Bristles are definitely a distinguishing character, but the usefulness of the character is entirely dependent upon preparation of the specimen.

The ambulatory legs of both species are heavily tubercled both above and below, those on the dactylus sometimes tending to become spiniform. However, the terminal edge of the propodus is smooth in *P. tubicola*, spinous in *P. tomentosa*.

The chelae of *P. tomentosa* are more robust than in *P. tubicola* and the teeth of the fixed finger occur in a single group rather than in two separate groups. The tooth of the dactylus of *P. tomentosa* is in the proximal half, while in *P. tubicola* it is medial or in the distal half. The lower margin of the palm is more nearly straight in *P. tubicola*, having a shallower concavity beneath the base of the fingers.

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Footnote

[1] Contribution number 22 of the Dauphin Island Sea Laboratory.